

**Membership and Coronal Activity in the NGC 2232 and Cr 140 Open Clusters**

**Grant NAG5-9131**

**Annual Performance Report No. 2**

**For the period 1 March 2001 through 28 February 2002**

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This is the second annual performance report for our grant "Membership and Coronal Activity in the NGC 2232 and Cr 140 Open Clusters."

1. Brief Description of the Primary Objectives and Scope of the Project

We propose to identify X-ray sources and extract net source counts in 8 archival ROSAT HRI images in the regions of the NGC 2232 and Cr 140 open clusters. These X-ray data will be combined with ground-based photometry and spectroscopy in order to identify G, K, and early-M type cluster members. At present, no members later than ~F5 are currently known for either cluster. With ages of ~25 Myr and at a distance of just 320 – 360 pc, the combined late-type membership of the NGC 2232 and Cr 140 clusters will yield an almost unique sample of solar-type stars in the post-T Tauri/pre-main sequence phase of evolution. These stars will be used to assess the level and dispersion in coronal activity levels, as part of a probe of the importance of magnetic braking and the level of magnetic dynamo activity, for solar-type stars just before they reach the ZAMS.

2. Progress Report

Over the past year we have successfully acquired all of the ground-based data necessary to support the analysis of the archival ROSAT X-ray data in the regions around both of these clusters. By the end of 2001 we expect to have completed the reduction and analysis of the ground-based photometry and spectroscopy and will begin the integration of these data with the ROSAT X-ray data. A certain amount of pressure to complete the work on NGC 2232 is coming from the SIRTf project, as this cluster may be a key component to a circumstellar disk evolution GTO program. We are only too happy to try to help and have worked to speed the analysis as much as possible.

3. Anticipated Activities for the Period 03/01/02 - 02/28/03

The primary activity to be undertaken in the next few months is the integration of the ground-based photometry and spectroscopy with the archival ROSAT X-ray data and then writing the paper summarizing our results. The most time consuming portion of this next phase is, of course, seeing the paper through publication in a peer-reviewed journal. Therefore, we have requested a no-cost extension to the grant to allow us to bring this project to a conclusion.